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THE SCIENCE OF NUTRITION IN THE U.S.S.R.

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Motto from I. P. Pavlov:

"When we shall know fully what happens in the organism to the nutrients we shall have gained insight into the very essence of the life processes."

There have been no Sputniks in recent Soviet nutritional research. But, the Russians claim a Sputnik-class discovery for their scientist, Nikolai Ivanovich Lunin (1853-1937), acclaimed as the "father" of the study of vitamins. Using whole milk as the natural food and the then known constituents of milk as the artificial diet, in 1880 Lunin compared the differences in health and development of white mice. The differences led him to the conclusion that whole milk must contain a substance or substances indispensable for animal nutrition. The Soviets accord large significance to Lunin's discovery for the development of the modern science of nutrition and the elaboration of the idea that traces of certain organic substances, eventually termed "vitamins," are needed in the diet for the body to function properly.

RESEARCH INSTITUTIONS

Nutritional research in the Soviet Union is centered primarily in three cities: Moscow, Leningrad and Kiev. The most important center is the Institute of Nutrition in Moscow, directed by Prof. Olga P. Molchanova. This Institute forms a part of the Academy of Medical Sciences. It has some 20 subdivisions, concerned with therapeutic nutrition, food hygiene, food technology, and various aspects of the basic sciences of nutrition as related to biochemistry, physiology and pathology. Special laboratories are devoted to protein research and vitamin study.

Among the other top-rank establishments is the All-Union Institute of Vitaminology, directed by Prof. B. A. Lavrov. This Institute is associated with the Ministry of Health, located in Moscow, with a branch in Leningrad.

Another nutrition research establishment is the Ukrainian Scientific Research Institute of Nutrition in Kiev. Included in this Institute are laboratories of biochemistry, physiology, and microbiology.

Nutritional research is carried on in medical clinics and institutes of hygiene, in addition to the special scientific establishments. One such institute is the Sanitary-hygienic Institute in Leningrad. There are also regional institutes, such as the Laboratory of Nutrition in Tbilisi (Tiflis).

RESEARCH INFORMATION

A 1960 bibliography of selected articles, written by authors who have been associated with the Moscow Institute of Nutrition, was thoroughly examined. A topical breakdown which emerges from the analysis of this bibliography yields a picture not too dissimilar from the pattern of Western literature in nutritional science and food technology. There are some differences in emphasis, though. One difference is the relatively larger number of reports that deal with effects of nutrition on formation, maintenance, and extinction of conditioned reflexes. These reflexes are regarded as criteria of "cortical dynamics." Soviet nutritional research shares with other Soviet life sciences the emphasis on the function of the central nervous system, studied by the methods developed by I. P. Pavlov (1849-1936) and interpreted in terms of his neurophysiological theories.

In therapeutic nutrition, which accounts for about 20% of the total registered output, a larger number of studies is concerned with the relation of nutrition to colitis and other diseases of the digestive system than we would find in American journals. Substantial attention is devoted to geographical considerations. This is reflected, in part, in investigations on those diseases, especially goiter, which have a particularly close relation to geographical features of man's environment.

Dr. Brožek

Some specific and general aspects of nutritional research in the Soviet Union have been recently described in greater detail elsewhere (1). These reports take into account the study of vitamins, energy, metabolism, semi-starvation, obesity, goiter, and therapeutic nutrition.

A very useful source of information on current research is the Proceedings of the Scientific Sessions held each spring at the Institute of Nutrition in Moscow. The number of reports in each section of the 1960 Proceedings is indicated in parentheses: Nutrition and health (11), Physiology and biochemistry of nutrition (60), Study of vitamins (16), Therapeutic nutrition (22), Nutrition of children (29), Food hygiene and technology (29).

An area of epidemiologically oriented nutritional research which remains wide open concerns the impact of nutrition on the development of degenerative diseases, especially those of the cardiovascular system and atherosclerosis in particular. In this regard the Soviet Union, with its highly diversified patterns of nutrition, is a veritable field laboratory.

(Continued on Page Eleven)

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Glances AT NUTRITION RESEARCH

Kwashiorkor is a nutritional deficiency disease resulting from a shortage of protein in proportion to carbohydrate sources of calories. It seems to mark the culmination of a series of stresses coming at a particularly critical stage for the individual.

Malnutrition In Preschool Children—A survey team examined 1322 children between the ages of 1 and 3 years in 24 rural villages throughout Haiti. The children were of low socio-economic groups and of predominantly African descent. Some degree of malnutrition resulting from too few calories and too little protein, affected about two-thirds of the group studied. The incidence of kwashiorkor for the whole survey averaged 7 percent and symptoms of kwashiorkor, without edema, were noted in another 10 percent.

Jelliffe, D. B. and Jelliffe, E. P. P. *Prevalence of Protein-Calorie Malnutrition in Haitian Preschool Children. Am. J. Pub. Health 50:1355 (Sept.) 1960.*

Enzyme Studies—Enzyme studies are important with kwashiorkor patients since kwashiorkor is a protein-deficiency disease and enzymes are proteins. One of the most characteristic findings in kwashiorkor is fatty infiltration of the liver. Serum enzyme levels are used as a measure of hepatic function. In the serum of kwashiorkor patients there is a significant reduction in the activity of amylase, alkaline phosphatase and pseudocholinesterase. The enzyme changes in 7.5 percent of kwashiorkor patients resemble the pattern in acute hepatic cell necrosis. It is predicted that a patient with these particular enzyme patterns will probably progress to liver cirrhosis if the patient survives.

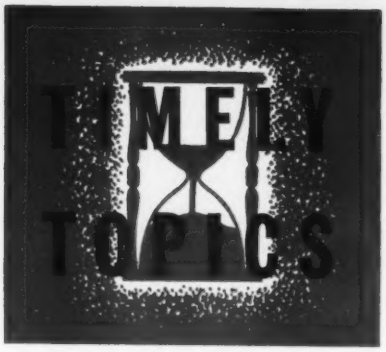
Edozien, J. C. *Enzymes in Serum in Kwashiorkor. Pediatrics 27:325 (Feb.) 1961.*

Deficiency Stresses—Stresses related to protein deficiency in child populations are: early failure of maternal lactation; growth retardation associated with dietary deficiency arising out of poverty, ignorance, prevalence of infection; poor housing and social disorganization among unskilled laborers in areas of rapid industrial development. Preliminary results of follow-up studies on discharged kwashiorkor patients indicate a steady weight gain was experienced by 67 percent and 25 percent became stationary in weight, lost weight, or had relapsed. Eight percent died. Most of the failures occurred in the first 9 months after discharge.

Moodie, Aileen. *Kwashiorkor in Cape Town: The Background of Patients and Their Progress After Discharge. J. Ped. 58:392 (Mar.) 1961.*

Moderate Protein Diet—One hundred thirty-one children between the ages of 12 to 36 months with varying degrees of kwashiorkor were fed diets containing 4 to 5 grams of protein per kilogram of body weight daily. Results indicated such levels of protein are effective in aiding edema loss, but not in weight gain. Since death most often results from fluid and electrolyte imbalance, it seems probable that diarrhea is the most serious manifestation of the disease.

Dean, R. F. A. *Treatment of Kwashiorkor with Moderate Amounts of Protein. J. Ped. 56:675 (May) 1960.*



Dr. Brožek

In 1959 Dr. Brožek became professor and chairman of the Department of Psychology, Lehigh University, Bethlehem, Pennsylvania. In addition to responsibilities at Lehigh University, he is a research associate with the Laboratory of Physiological Hygiene, School of Public Health, University of Minnesota.

Dr. Brožek's original home was in Melnik, Czechoslovakia. He did his undergraduate work at the Masaryk Realgymnasium in Plzen, and in 1937 received his Ph.D. in psychology from Karlova Universital, Prague. Dr. Brožek came to this country in 1939 to attend the University of Pennsylvania, and later the University of Minnesota where he served as professor, Laboratory of Physiological Hygiene, School of Public Health.

Dr. Brožek is a member of the American Psychological Association, the American Public Health Association, and the American Society of Physiology. He has served as associate editor of Nutrition Reviews, and as editor of "Human Biology" in 1953.

Congress of Dietetics

The Third International Congress of Dietetics was held the week of July 10-14, 1961 in London. Forty different countries were represented. Among the papers presented were those on world food patterns and problems, therapeutic diets, atherosclerosis, nutrition education, administration and teaching nutrition to nurses. Simultaneous translations in English, French, and German were provided through earphones at each seat.

THE SCIENCE OF NUTRITION IN THE U.S.S.R.

(Continued from Page Nine)

SOVIET PSYCHODIETETICS

In view of general emphasis on function of the central nervous system, it is not surprising that a separate laboratory was established in Moscow for the specific purpose of studying impact of diet on "higher nervous activity." This is the Soviet physiologist's label for what Western psychologists call "mind," "psyche," or "behavior."

There are two important characteristics of these Soviet dietary studies. One is almost complete limitation to one type of behavior, conditioned reflexes, as an indicator of the functional status of the central nervous system. The second characteristic is that the overwhelming majority of studies are done on animals, most frequently dogs (not uncommonly, *a dog*).

In studying effects of nutrition on conditioned reflexes, attention was given to intensity and speed of formation of conditioned reflexes (2). Typically, intensity was measured in terms of drops of saliva secreted when a conditioned stimulus was presented (3). Deficiencies of both calories and individual nutrients were considered.

Experimental studies on the effects of restricted calorie intake go back to 1918. In semistarved dogs, deterioration of discriminatory responses was among the first signs of neurophysiological disturbances. This deterioration was manifested in the animals' inability to differentiate between two similar stimuli, such as lights differing in their intensity; the dogs were unable to inhibit a salivary response to the "negative" light stimulus, never reinforced with food. In time, as the calorie deficiency became more severe, the conditioned reflexes to "positive" stimuli, previously reinforced with food, decreased in intensity and were eventually abolished. It was not possible to establish new positive, much less new differential (inhibitory) responses. The unconditioned salivary reflex was maintained to the very last but its intensity was decreased.

This is the general type of criteria of nervous function used, together with conditioned motor avoidance reflexes, in studying nutrient deficiencies. The B vitamins, especially thiamine, riboflavin, niacin, and pyridoxine, were given particular attention.

A recent Soviet experimental report contained the comment that protein deficiency readily resulted in marked disturbances of the function of the brain cortex, evaluated in terms of conditioned reflexes. The Soviet investigators report that the capacity to form new conditioned reflexes is the first to be affected by a protein deficiency, but even previous solidly established conditioned reflexes may be depressed or abolished. This statement is of interest since severe protein deficiency in young children is widespread in underdeveloped tropical and subtropical regions. The statement calls for verification but it suggests the usefulness of utilizing the study of conditioned reflexes more widely in clinical experimental dietary studies in man.

Fat/carbohydrate ratios have been varied to study the functional characteristic of the brain referred to by the Soviet investigators as "cortical excitability." Sergeeva (1956) studied the effects of isocaloric diets providing 20% of calories as protein, with varying amounts of fat and carbohydrate. Salivary responses, conditioned to a tone or sound of a metronome and electroencephalographic tracings, were used as criteria of brain function.

The control diet contained the standard percent of protein, 30% fat and 50% carbohydrate. The "high fat" diet provided 60% fat and 20% carbohydrate. The "low fat" diet provided 15% fat and 65% carbohydrate. The "high fat" diet produced responses interpreted as indicators of a weakening of activity of the cerebral cortex.

By contrast, the high carbohydrate diet resulted in changes regarded, in the Pavlovian frame of reference, as indicative of heightened excitability of the cerebral cortex. The study can be readily repeated and should be; not only the extremes but the intermediary range of values of the fat/carbohydrate ratio should be explored. The problem may have important implications for human nutrition.

Questions asked by the Soviets are significant though we may not always like their methodology and may argue about their interpretation of the results. In 1953 A. I. Makarychev, the first director of the Laboratory for the Study of Higher Nervous Activity, stated broader goals of the science of nutrition than we are likely to find in the biochemically and medically oriented Western nutritional literature. These goals involved eventual development of a diet which not only will be conducive to man's health and longevity but will facilitate the unfolding of the highest forms of man's intellect.

1. Brožek, J. *Nutritional Research in the Soviet Union. Part I. Some General Aspects. Part II. Some Specific Aspects. Nut. Rev. 19:129, 161 (May, June) 1961.*
2. Brožek, J. and Vaes, G. *Experimental Investigations on the Effects of Dietary Deficiencies on Animal and Human Behavior. Vitamins and Hormones. 1961.*
3. Brožek, J. *Soviet Studies on Nutrition and Higher Nervous Activity. Monograph No. 24. N.Y. Acad. of Sci. 1961.*

NUTRITION IN THE HOME ECONOMICS CURRICULUM

Developed in cooperation with Ruth Wheeler, Chairman, Department of Home Economics, Evanston Township High School, Evanston, Illinois

Because we live in a rapidly changing society, individuals must constantly explore, investigate, question, discover, and invent new adventures in living. These creative processes should be developed in students to help them enrich their personal and family lives. In the high school curriculum, home economics presents subject matter and provides experiences to prepare students for responsibilities they face, or will face, as individuals and as members of a family and community.

Through foods and nutrition, students can learn how to meet and understand advances in nutrition, new products, new methods of food preparation, as well as those basic principles already established. Students can acquire skills in planning, preparing, and serving meals. They can gain some competency in making the transition from a life controlled by adults to one in which they have some responsibility for themselves and their future.

But, these objectives will be fulfilled only if teaching is imaginative, sound, and exciting. Teen-agers are concerned about their growth, appearance, personality, and efficiency. These concerns can be correlated with nutrition teaching to give the teen-ager better understanding of himself and his relationships with others. The approach to teaching nutrition is of utmost importance. Here are techniques which have been used and found successful.

One teacher found a way to study how food could help students become what they wanted to be. She used a collection of food records which had been kept by a group of senior students the previous year. Her home economics

(Continued on Page Twelve)

—that if our population reaches 230 million by 1975, as predicted, 47 billion pounds more of milk per year must be produced if we are to continue to improve our diets at the same rate as in recent years?

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—that men on the moon may get their supply of water from stones found there, believed to contain as much as five percent water?

●

—that Welsh Rabbit is the correct spelling for a dish reputedly originated by a Welsh chieftain who, when called upon to entertain a few hundred unexpected guests at a dinner, had to substitute a cheese dish for rabbit, the game customarily served?

●

—that bakers in Ancient Rome were required to bake their names into each loaf of bread? Heavy penalties were imposed on those who cheated on ingredients or weight.

●

—that the Romans and Greeks did not use butter as a food, but as the standard remedy for injuries to the skin?

●

—that the lifetime quota of water usage for the average person in the U. S. is some 3,500,000 gallons?

●

—that ice cream sales show a shift in buying patterns? Ten years ago only 8 percent of all ice cream was sold in pre-packed half-gallon containers. Today, more than half of all ice cream sells in these larger packages.

THINGS YOU'LL LIKE TO READ

Food, Nutrition and Diet Therapy—Krause, Marie V. 3rd Ed. Philadelphia: W. B. Saunders Co. 1961. $6.75.

This book is written primarily for student nurses. But, homemakers, public health workers, college home economic students, dietetic interns and physicians have been kept in mind. The entire book has been revised, and much of it rewritten—based upon the 1958 Recommended Dietary Allowances, National Academy of Sciences—National Research Council. The text is divided into four parts: normal nutrition; diet therapy; maternal and child nutrition; food selection, preparation and service for laboratory experiences in either nutrition or diet therapy.

Control of Malnutrition in Man—New York: American Public Health Association, Inc. 1960.

This volume was prepared by internationally recognized authorities in the field of nutrition. It has been designed and written primarily for information and convenience of the physician, nurse, and nutritionist. The volume is divided into sections: protein and caloric malnutrition; vitamin deficiencies; mineral deficiencies; other factors. Thirty different conditions of malnutrition are considered, each presented in the following pattern: identification; etiology; occurrence; methods of control, prevention and treatment.

NUTRITION IN THE HOME ECONOMICS CURRICULUM

(Continued from Page Eleven)

students were asked to review records (which were unidentified) and describe the person who had eaten the food. The students were surprisingly accurate in establishing where the girl had eaten her meals, if she was on a diet to gain or lose weight, if she was frequently absent from school, whether her grades were good or poor, and, most important, what she could have eaten to improve her meals. It was but a small transition to relate this nutrition information to personal action.

Nutrition teaching can be woven into school life in such a way that it carries over into the home and community. An appeal to girls is their desire to be mothers some day. Why not capitalize on this in teaching child development units? The importance of continually maintaining oneself in the best possible health as preparation for motherhood can be a strong point of emphasis. Girls can plan and carry out projects for helping small children develop sound eating habits. The brothers, sisters, nieces, nephews or neighborhood children, for whom they are often responsible, serve as a "built-in" laboratory. This application of learning prepares students to meet and evaluate, with a feeling of familiarity, challenges they may face.

Home economics works to develop responsible, perceptive, and well-informed citizens aware of the world around them. A nutritionist from the health department or a dietitian from the local hospital may be invited to share her knowledge of teen-age nutrition. As a nutrition specialist she can give examples and quote sources which emphasize the importance of an adequate diet now and in future years. Besides, her very presence introduces an outside personality. A new person in the classroom can say the same things as the teacher, but the "newness" creates a more lasting impression!

Snacks are important to the social life of teen-agers. The enterprising teacher sees this as another opportunity to capitalize on the student's natural interest. The foods lab, though not usually thought of as a transformer, is a vehicle for transposing commonly used foods into appetizing and socially acceptable snack foods. Who knows, these foods may start a new style in social eating and may accomplish the objective of encouraging better food selection. Why? Because nutritional needs, selection, preparation, and use of food for the day can be interwoven with classroom activities highlighting snack foods.

There are many other teen-age concerns which can spark an interest in nutrition—the teen-age girl's attention to her figure, the boy to his physique, the personal fitness of both as well as other concerns. We are limited only by our imaginations. How well will we meet the challenge?